T. L. Harpster
VP-Bell Bend Project-Development

PPL Bell Bend, LLC
38 Bomboy Lane, Suite 2
Berwick, PA 18603
Tel. 570.802.8111 FAX 570.802.8119
tlharpster@pplweb.com

COPY

May 13, 2009

Project Review Coordinator
Susquehanna River Basin Commission
1721 North Front Street
Harrisburg, PA 17102-2391

ATTN: Paula B. Ballaron, Regulatory Program Director

BELL BEND NUCLEAR POWER PLANT
APPLICATION FOR GROUNDWATER WITHDRAWAL
APPLICATION FOR SURFACE WATER WITHDRAWAL
APPLICATION FOR CONSUMPTIVE WATER USE
BNP-2009-073

Dear Ms. Ballaron:

Enclosed for the Susquehanna River Basin Commission's review and approval please find the following applications for water withdrawal and use at the proposed Bell Bend Nuclear Power Plant (BBNPP), to be located in Salem Township, Luzerne County, PA:

- Application for groundwater withdrawal up to a maximum 30-day average of 3.3 million gallons per day (mgd);
- Application for surface water withdrawal up to a maximum of 44 mgd (peak day); and
- Application for consumptive water use up to a maximum of 31 mgd (peak day).

BBNPP is owned and will be operated by PPL Bell Bend, LLC (PPL BB). PPL BB is owned by PPL Bell Bend Holdings, LLC which in turn is an indirect subsidiary of PPL Corporation. PPL BB will be the licensed operator of BBNPP.

General Information

BBNPP will be a single-unit nuclear power plant with a net electrical output of approximately 1,600 megawatts. BBNPP will be located southwest of and adjacent to the Susquehanna Steam Electric Station (SSES). BBNPP will employ a U.S. Evolutionary Power Reactor, which is a pressurized water reactor expected to have a life of at least 60 years. PPL BB expects to receive a license from the U.S. Nuclear Regulatory Commission (NRC) for an initial period of 40 years.

The primary water source for BBNPP will be the Susquehanna River. The BBNPP river intake will be located approximately 300 ft. downstream from the SSES river intake. The river intake will contain six river pumps: three pumps (each rated at 13,100 gpm) will be components of the Circulating Water System Makeup Water System (CWSMWS); and three pumps (each rated at 2,900 gpm) will be components of the Raw Water Supply System (RWSS). The RWSS will provide water to the Essential Service Water Emergency Makeup System (ESWEMS) and several relatively minor uses. Two CWSMWS pumps and one RWSS pump will provide sufficient water supply during normal plant operation.

2009-080
2009-078 2009-079

ENTERED
Date: 5/15/09
Initials: BEW

The CWSMWS will provide turbine condenser cooling and will have two natural draft evaporative cooling towers (the "Main" cooling towers). The ESWEMS will provide water for cooling the reactor core and other plant components during both normal and emergency conditions. The ESWEMS will have eight mechanical forced draft evaporative cooling towers; during normal plant operation only two ESWEMS cooling towers will be in service at any given time. Blowdown from both the CWSMWS and ESWEMS cooling towers will be discharged to the Combined Waste Water Retention Basin and thence to the River via a common discharge line, with a submerged diffuser in the river. The BBNPP discharge diffuser will be located approximately 680 ft. downstream from the BBNPP river intake and approximately 380 ft. downstream from the SSES discharge diffuser.

On October 10, 2008 PPL BB submitted a Combined License Application (COLA) for the construction and operation of BBNPP to the NRC. On December 19, 2008 the NRC accepted the COLA for docketing. The COLA may be viewed on the NRC website at:

http://www.nrc.gov/reactors/new-reactors/col/bell-bend.html

Mobilization and site preparation activities are currently scheduled to begin during the third quarter 2011, and initial commercial operation of BBNPP is currently scheduled for December 2018. PPL BB will advise the Commission of any substantive changes to these dates.

Application for Groundwater Withdrawal

PPL BB is applying for approval of groundwater withdrawal of up to 3.3 mgd as a 30-day average. It is expected that groundwater will be withdrawn only during construction. The sole purpose of the withdrawal will be to dewater the area in which the reactor building and ESWEMS structures will be constructed. A slurry wall will be installed along the perimeter of the area to be dewatered. The dewatering system will consist of approximately 30 wells located inside of and along the length of the slurry wall. The maximum rate of groundwater withdrawal will occur during a two- to three-month period early in construction to draw down the groundwater level within the area enclosed by the slurry wall. Following drawdown, groundwater withdrawal will be continued in order to maintain dry conditions for excavation and foundation construction. On-site withdrawal of groundwater is expected to cease completely prior to plant operation.

Some of the groundwater withdrawn during construction is expected to be used for construction purposes. Most or all of the use of groundwater during construction is expected to be consumptive. The consumptive use of groundwater is included in the application for consumptive water use.

The daily amount of groundwater withdrawal will be monitored and reported by PPL BB in accordance with a monitoring plan approved by the Commission.

Application for Surface Water Withdrawal

PPL BB is applying for approval of surface water withdrawal from the Susquehanna River of up to 44 mgd (peak day). Water will be withdrawn from the River only during plant operation (not during construction). Except for potable/sanitary water to be supplied by the local water purveyor, all water used during plant operation will be withdrawn from the River.

The primary use of surface water will be for the CWSMWS and ESWEMS, predominately cooling tower loss (evaporation and drift) and blowdown. The consumptive use of surface water is included in the application for consumptive water use.

The daily amount of surface water withdrawal will be monitored and reported by PPL BB in accordance with a monitoring plan approved by the Commission.

Application for Consumptive Water Use

PPL BB is applying for approval of consumptive water use of up to 31 mgd (peak day). Cooling tower evaporation represents more than 99 percent of the estimated peak day consumptive water use. The maximum (peak day) consumptive water use during construction is estimated to be approximately 0.12 mgd; consumptive use of groundwater is expected to cease prior to plant operation.

The daily amount of consumptive water use will be estimated and reported by PPL BB in accordance with a monitoring plan approved by the Commission.

Mitigation for Consumptive Water Use

PPL BB will reimburse the Commission for the Commission's costs of water supply storage, in accordance with the Commission's consumptive water use regulations, for the consumptive water use attributable to the project. In addition, PPL BB will continue to work closely with the Commission and other stakeholders to attempt to identify potential sources of mitigation acceptable to the Commission and to PPL BB that could be used in lieu of all or part of the monetary reimbursement. As the Commission is aware, the potential use of mine pools as sources of replacement water to provide mitigation is being evaluated.

Commission's Passby Flow Policy

PPL BB believes the Commission's "Guidelines for Using and Determining Passby Flows and Conservation Releases for Surface-Water and Groundwater Withdrawal Approvals" dated November 8, 2002 are intended to preserve flow to protect fisheries in small streams and therefore should not apply to BBNPP. However, even if the Commission considers the Guidelines in its review of the proposed BBNPP surface water withdrawal, the proposed surface water withdrawal is "minimal" as defined in the Guidelines.

The proposed BBNPP surface water withdrawal and discharge, and the existing SSES surface water withdrawal and discharge, all occur within the same pool in the River. The enclosed report "River Evaluation in the Vicinity of the SSES River Water Intake and River Diffuser and the Proposed BBNPP Intake and Diffuser" describes the pool and the prospective net effect of the two plants' withdrawals and discharges on the pool level. As explained in the report, the aggregate net withdrawal of SSES and BBNPP will not significantly affect water levels in the river pool and the upstream-to-downstream sequence of withdrawal and discharge has minimal effect on local aquatic habitat.

Request for Extension of Term of Approval

While PPL BB understands the Commission's need for flexibility in project approvals to meet potentially changing hydrologic or environmental conditions, it is PPL BB's opinion that the 15-year term of approval cited in Section 806.31 of the Commission's regulations is inappropriately short for a major electric generating unit, given the project's size, complexity and cost. PPL BB respectfully requests that the term(s) of the Commission's docket approval(s) for BBNPP surface water withdrawal and consumptive water use extend to the expiration date of the 40-year combined license (COL) expected to be issued by the NRC, while reserving the

Commission's right to reasonably revise docket conditions after appropriate notice and opportunity for hearing.
The following explanation of a COL is excerpted from the NRC's website:

> By issuing a [COL], the [NRC] authorizes the licensee to construct and (with specified conditions) operate a nuclear power plant at a specific site, in accordance with established laws and regulations. A COL is valid for 40 years from the date of the Commission finding, under Title 10, Section 52.103 (g), of the *Code of Federal Regulations* [10 CFR 52.103(g)], that the acceptance criteria in the combined license are met.

Request for Extension of Time to Commence Water Use

PPL BB respectfully requests that any docket(s) approving the groundwater withdrawal, the surface water withdrawal and the consumptive water use applied for herein grant a five-year period to commence the respective withdrawals and consumptive water use. In accordance with the project schedule, the three-year period stated in Section 806.31(b) of the Commission's regulations will probably allow insufficient time for commencement of water use related to plant operation and possibly even for commencement of water use related to plant construction. Also, PPL BB wishes to reserve the right to request an extension of the five-year period should such extension become necessary.

Project Review Fees

Based on the Commission's Project Fee Schedule effective through December 31, 2009 the respective fees associated with the applications submitted herewith are:

Groundwater withdrawal (3.3 mgd, 30-day average)	$ 8,825
Surface water withdrawal (44 mgd, peak day)	177,410
Consumptive water use (31 mgd, peak day)	44,100
Total Project Review Fee	$ 230,335

PPL BB elects the option to pay the surface water withdrawal fee and the consumptive water use fee in three consecutive equal annual installments with interest, as offered in the Project Fee Schedule. Accordingly, concurrent with this application, PPL BB is submitting by electronic transfer to the Commission's account an amount of $82,662 representing the total of the groundwater withdrawal fee, one-third of the surface water withdrawal fee, and one-third of the consumptive water use fee.

Public Notice of Applications

PPL BB is proceeding to issue public notice of these applications in accordance with the Commission's regulations. Notifications will be made to Luzerne County, the Luzerne County Planning Commission, Salem Township, a local newspaper, and owners of properties contiguous to the BBNPP site.

PPL BB respectfully requests the Commission's approval within two years of the date of receipt of the enclosed applications. Representatives of PPL BB will be available to provide further information to support the review process. Should you or your Staff have any questions, please contact Tinku Khanwalkar at 610.774.5466 or akhanwalkar@pplweb.com.

We look forward to working with your Staff in this matter.

Respectfully,

Terry L. Harpster

Attachment 1: Report: "River Evaluation in the Vicinity of the SSES River Water Intake and River Diffuser and the Proposed BBNPP Intake and Diffuser," Ecology III, Inc., September 12, 2008 (Revised May 6, 2009)
Attachment 2: Groundwater Withdrawal Application
Attachment 3: Surface Water Withdrawal Application
Attachment 4: Consumptive Water Use Application

cc: (w/o attachment)

Mr. Thomas W. Beauduy
Deputy Director
Susquehanna River Basin Commission
1721 North Front Street
Harrisburg, PA 17102-2391

Mr. Michael G. Brownell
Chief, Water Resources Management
Susquehanna River Basin Commission
1721 North Front Street
Harrisburg, PA 17102-2391

Mr. Paul O. Swartz
Executive Director
Susquehanna River Basin Commission
1721 North Front Street
Harrisburg, PA 17102-2391

COPY

Attachment 1

Report: "River Evaluation in the Vicinity of the SSES River Water Intake and River Diffuser and the Proposed BBNPP Intake and Diffuser," Ecology III, Inc., September 12, 2008 (Revised May 6, 2009)

RIVER EVALUATION
IN THE VICINITY OF THE SSES RIVER WATER INTAKE AND RIVER DIFFUSER AND THE PROPOSED BBNPP INTAKE AND DIFFUSER

Prepared by

Theodore V. Jacobsen
Ecology III, Inc.
804 Salem Blvd.
Berwick, PA 18603

12 September 2008
Revised 14 January 2009
Revised 6 May 2009

The Susquehanna Steam Electric Station (SSES) river water intake and discharge diffuser are located on the west bank of the Susquehanna River approximately six miles upriver from Berwick, PA. The proposed Bell Bend Nuclear Power Plant (BBNPP) river water intake will be constructed 300 feet downriver from the SSES intake. The SSES diffuser is located 615 feet downriver from the SSES intake and the proposed BBNPP discharge diffuser will be 380 feet downriver from the SSES diffuser and extend farther out into the river. All four of these structures are located near the middle of a large river pool that begins at a relatively shallow section in front of the Susquehanna SES Environmental Laboratory and extends downriver at least 3,840 feet to the next shallow area (Fig. 1).

The profile of this pool was mapped as part of a more extensive contour mapping survey in 1983 (Ichthyological Associates, Inc. 1984. *Ecological Studies of the Susquehanna River in the Vicinity of the Susquehanna Steam Electric Station*). Although this work was done over 25 years ago, our resident scuba divers agree that there has been no apparent change in the bathymetry of this river pool. This is further substantiated by our aquatic monitoring activities throughout the pool during most months each year from 1983 to the present, which also indicates that the pool has remained about the same. The depth contours in this pool were measured at a river level of 486.2 feet above mean sea level (msl) (Environmental Lab river level of 3.2 feet with a river flow of 1570 cfs). The average width throughout the reach of the pool was 790 feet. If an average depth of 5 feet is assumed at this river level, the volume of the pool can be calculated by the following:

Pool volume = length (3840 ft) X width (790 ft) X depth (5 ft) =15,168,000 ft^3
or 15,168, 000 ft^3 X 7.48 gal/ ft^3 = 113,456,640 gal
or 348.2 acre ft of water

Even if the pool volume was determined at a river level at the Environmental Lab of 2.7 feet msl, which corresponds to a flow at the Environmental Lab of 806 cfs (less than the 820 cfs Q7-10 at Wilkes-Barre 20 miles upriver), the volume is still over 98,000,000 gallons calculated as follows:

Pool volume = 3840 ft X 760 ft (decrease in pool width of 30 ft) X 4.5 ft (decrease of 0.5 ft in depth) = 13,132,800 ft^3
or 13,132,800 ft^3 X 7.48 gal/ft^3 = 98,233,344 gal
or 301.5 acre ft of water

River flow into this pool has been measured at the Environmental Lab since 1973. The relationship of river depth to river flow at the Lab was documented (Soya 1991. *Depth-level-flow relationship of the Susquehanna River at the Susquehanna SES Environmental Laboratory.* Ecology III, Inc., Berwick, PA) with a history of refinements of various regression models to more accurately determine flow from depth. This work resulted in the river depth, level, and flow chart in Attachment 1.

With a river pool volume of 98,000,000 gallons and a river flow into the pool of over 800 cfs or 360,000 gal/min during extreme drought conditions, there will be a negligible effect on the pool level along the 995-foot stretch of this complex. Maximum intake withdrawals at SSES (45,000 gpm) and the proposed BBNPP (27,800 gpm) will result in discharges at SSES (12,500 gpm) and BBNPP (8,700 gpm). This net withdrawal of 52,000 gpm will cause a decrease in river level of approximately 0.08 feet. Little or no loss of aquatic habitat should occur in this area of the pool except during construction of the proposed structures. Overall, the proposed location of the BBNPP intake upstream from the SSES discharge should not be problematic to the aquatic environment within this 67-acre river pool, even during low flow conditions.

The four photographs of the upriver and downriver shallows and the two views of the river pool were done at an Environmental Lab river level of 3.5 feet (486.5 ft above msl) for river flow at the Lab of 2,140 cfs or 960,000 gpm on 8 September 2008. The upriver shallows and the downriver view of the pool were taken from the Lab boat ramp. The downriver shallows and the upriver view of the pool were taken at the PPL Wetlands Cottage, not shown in Fig. 1. Both the upriver and particularly the downriver shallows are much more visible at the lower river levels used in the above calculations of pool volume.

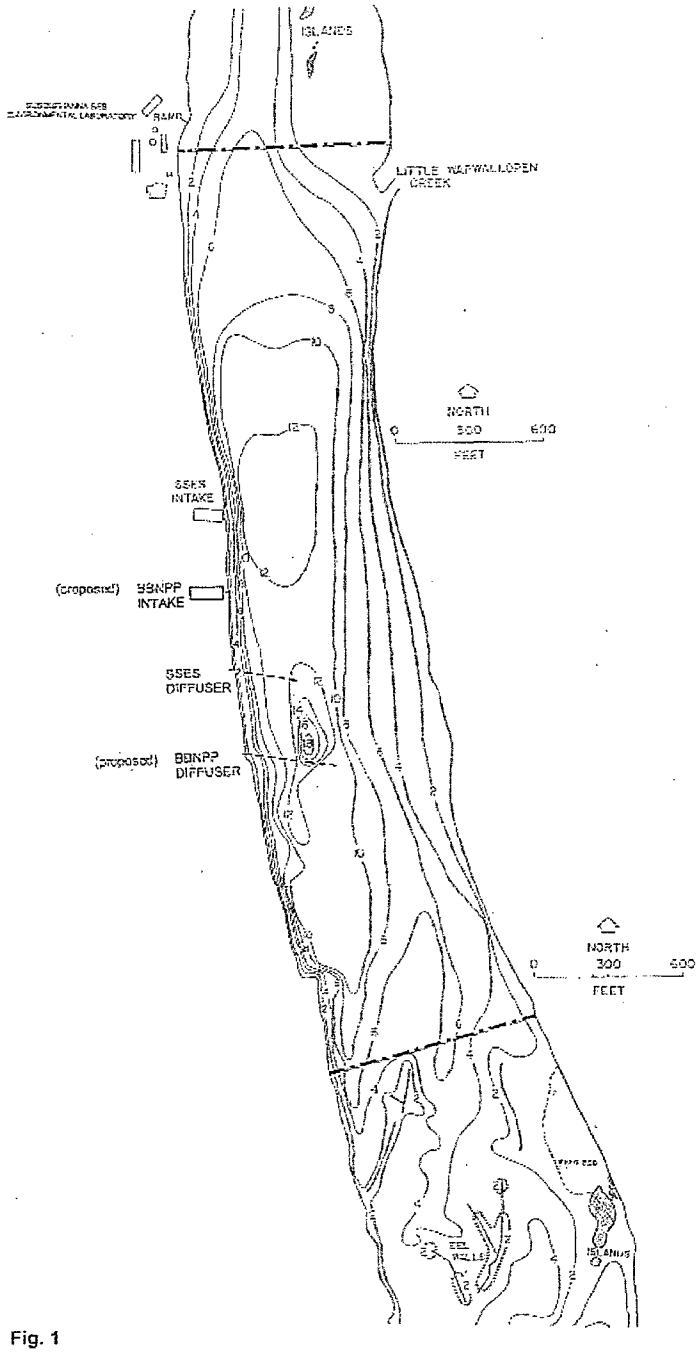


Fig. 1

Location of the Susquehanna Steam Electric Station (SSES) and the proposed Bell Bend Nuclear Power Plant (BBNPP) river water intakes and discharge diffusers along the west bank of a pool in the Susquehanna River, six miles upriver from Berwick, PA, 2008. Depth contours at 2-foot intervals based on a river level at 486.2 feet above mean sea level surveyed in 1983.

ATTACHMENT 1

SEP 1991

DEPTH - LEVEL - FLOW relationship of the Susquehanna River at the Susquehanna SES Environmental Laboratory.

DEPTH (ft)	LEVEL (ft above msl)	FLOW (cfs)	FLOW RANGE (cfs)	DEPTH (ft)	LEVEL (ft above msl)	FLOW (cfs)	FLOW RANGE (cfs)	DEPTH (ft)	LEVEL (ft above msl)	FLOW (cfs)	FLOW RANGE (cfs)
2.1	485.1	403	379–428	6.1	489.1	9540	9358–9726	10.1	493.1	29370	29100–29700
2.2	485.2	455	428–483	6.2	489.2	9910	9726–10100	10.2	493.2	30000	29700–30300
2.3	485.3	513	483–544	6.3	489.3	10290	10100–10500	10.3	493.3	30630	30300–31000
2.4	485.4	576	544–610	6.4	489.4	10670	10500–10900	10.4	493.4	31270	31000–31600
2.5	485.5	646	610–683	6.5	489.5	11060	10900–11300	10.5	493.5	31920	31600–32200
2.6	485.6	723	683–763	6.6	489.6	11460	11300–11700	10.6	493.6	32570	32200–32900
2.7	485.7	806	763–851	6.7	489.7	11860	11700–12100	10.7	493.7	33230	32900–33500
2.8	485.8	897	851–945	6.8	489.8	12270	12100–12500	10.8	493.8	33900	33600–34200
2.9	485.9	1000	946–1050	6.9	489.9	12690	12500–12900	10.9	493.9	34570	34200–34900
3.0	486.0	1210	1050–1300	7.0	490.0	13110	12900–13300	11.0	494.0	35250	34900–35600
3.1	486.1	1390	1300–1480	7.1	490.1	13540	13300–13800	11.1	494.1	35930	35600–36300
3.2	486.2	1570	1480–1660	7.2	490.2	13970	13800–14200	11.2	494.2	36620	36300–37000
3.3	486.3	1750	1660–1850	7.3	490.3	14420	14200–14600	11.3	494.3	37320	37000–37700
3.4	486.4	1940	1850–2040	7.4	490.4	14860	14600–15100	11.4	494.4	38020	37700–38400
3.5	486.5	2140	2040–2240	7.5	490.5	15320	15100–15500	11.5	494.5	38730	38400–39100
3.6	486.6	2350	2240–2450	7.6	490.6	15780	15500–16000	11.6	494.6	39450	39100–39800
3.7	486.7	2560	2450–2660	7.7	490.7	16250	16000–16500	11.7	494.7	40170	39800–40500
3.8	486.8	2770	2660–2880	7.8	490.8	16720	16500–17000	11.8	494.8	40900	40500–41300
3.9	486.9	3000	2880–3110	7.9	490.9	17200	17000–17400	11.9	494.9	41640	41300–42000
4.0	487.0	3230	3110–3350	8.0	491.0	17690	17400–17900	12.0	495.0	42380	42000–42800
4.1	487.1	3460	3350–3580	8.1	491.1	18180	17900–18450	12.1	495.1	43130	42800–43500
4.2	487.2	3710	3580–3830	8.2	491.2	18680	18450–18900	12.2	495.2	43890	43500–44300
4.3	487.3	3960	3830–4080	8.3	491.3	19180	18900–19400	12.3	495.3	44650	44300–45000
4.4	487.4	4210	4080–4340	8.4	491.4	19690	19400–20000	12.4	495.4	45410	45000–45800
4.5	487.5	4480	4340–4610	8.5	491.5	20210	20000–20500	12.5	495.5	46190	45800–46600
4.6	487.6	4740	4610–4880	8.6	491.6	20740	20500–21000	12.6	495.6	46970	46600–47400
4.7	487.7	5020	4880–5160	8.7	491.7	21270	21000–21500	12.7	495.7	47760	47400–48200
4.8	487.8	5300	5160–5440	8.8	491.8	21810	21500–22100	12.8	495.8	48550	48200–48900
4.9	487.9	5590	5440–5740	8.9	491.9	22350	22100–22600	12.9	495.9	49350	48900–49800
5.0	488.0	5880	5740–6030	9.0	492.0	22900	22600–23200	13.0	496.0	50160	49800–50600
5.1	488.1	6180	6030–6340	9.1	492.1	23460	23200–23700	13.1	496.1	50970	50600–51400
5.2	488.2	6490	6340–6650	9.2	492.2	24020	23700–24300	13.2	496.2	51790	51400–52200
5.3	488.3	6800	6650–6960	9.3	492.3	24590	24300–24900	13.3	496.3	52610	52200–53000
5.4	488.4	7120	6960–7290	9.4	492.4	25160	24900–25500	13.4	496.4	53440	53000–53900
5.5	488.5	7450	7290–7620	9.5	492.5	25750	25500–26000	13.5	496.5	54280	53900–54700
5.6	488.6	7780	7620–7950	9.6	492.6	26340	26000–26600	13.6	496.6	55130	54700–55600
5.7	488.7	8120	7950–8290	9.7	492.7	26930	26600–27200	13.7	496.7	55980	55600–56400
5.8	488.8	8470	8290–8640	9.8	492.8	27530	27200–27800	13.8	496.8	56840	56400–57300
5.9	488.9	8820	8640–9000	9.9	492.9	28140	27800–28400	13.9	496.9	57700	57300–58100
6.0	489.0	9180	9000–9360	10.0	493.0	28750	28400–29100	14.0	497.0	58570	58100–59000

(continued)

ATTACHMENT 1 (continued)

DEPTH (ft)	LEVEL (ft above msl)	FLOW (cfs)	FLOW RANGE (cfs)	DEPTH (ft)	LEVEL (ft above msl)	FLOW (cfs)	FLOW RANGE (cfs)	DEPTH (ft)	LEVEL (ft above msl)	FLOW (cfs)	FLOW RANGE (cfs)
14.1	497.1	59450	59000-59900	18.1	501.1	99760	99200-100000	22.1	505.1	150300	150000-151000
14.2	497.2	60330	59900-60800	18.2	501.2	100900	100000-101000	22.2	505.2	151700	151000-152000
14.3	497.3	61220	60800-61700	18.3	501.3	102000	101000-103000	22.3	505.3	153100	152000-154000
14.4	497.4	62110	61700-62600	18.4	501.4	103200	103000-104000	22.4	505.4	154500	154000-155000
14.5	497.5	63020	62600-63500	18.5	501.5	104400	104000-105000	22.5	505.5	155900	155000-157000
14.6	497.6	63920	63500-64400	18.6	501.6	105500	105000-106000	22.6	505.6	157300	157000-158000
14.7	497.7	64840	64400-65300	18.7	501.7	106700	106000-107000	22.7	505.7	158800	158000-159000
14.8	497.8	65760	65300-66200	18.8	501.8	107900	107000-108000	22.8	505.8	160200	159000-161000
14.9	497.9	66690	66200-67200	18.9	501.9	109000	108000-110000	22.9	505.9	161600	161000-162000
15.0	498.0	67620	67200-68100	19.0	502.0	110200	110000-111000	23.0	506.0	163100	162000-164000
15.1	498.1	68560	68100-69000	19.1	502.1	111400	111000-112000	23.1	506.1	164500	164000-165000
15.2	498.2	69510	69000-70000	19.2	502.2	112600	112000-113000	23.2	506.2	166000	165000-167000
15.3	498.3	70460	70000-70900	19.3	502.3	113800	113000-114000	23.3	506.3	167500	167000-168000
15.4	498.4	71420	70900-71900	19.4	502.4	115100	114000-116000	23.4	506.4	168900	168000-170000
15.5	498.5	72390	71900-72900	19.5	502.5	116300	116000-117000	23.5	506.5	170400	170000-171000
15.6	498.6	73360	72900-73900	19.6	502.6	117500	117000-118000	23.6	506.6	171900	171000-173000
15.7	498.7	74340	73900-74800	19.7	502.7	118700	118000-119000	23.7	506.7	173400	173000-174000
15.8	498.8	75330	74800-75800	19.8	502.8	120000	119000-121000	23.8	506.8	174900	174000-176000
15.9	498.9	76320	75800-76800	19.9	502.9	121200	121000-122000	23.9	506.9	176400	176000-177000
16.0	499.0	77320	76800-77800	20.0	503.0	122500	122000-123000	24.0	507.0	177900	177000-179000
16.1	499.1	78320	77800-78800	20.1	503.1	123800	123000-124000	24.1	507.1	179400	179000-180000
16.2	499.2	79330	78800-79800	20.2	503.2	125000	124000-126000	24.2	507.2	180900	180000-182000
16.3	499.3	80350	79800-80900	20.3	503.3	126300	126000-127000	24.3	507.3	182500	182000-183000
16.4	499.4	81370	80900-81900	20.4	503.4	127600	127000-128000	24.4	507.4	184000	183000-185000
16.5	499.5	82400	81900-82900	20.5	503.5	128900	128000-130000	24.5	507.5	185600	185000-186000
16.6	499.6	83440	82900-84000	20.6	503.6	130200	130000-131000	24.6	507.6	187100	186000-188000
16.7	499.7	84480	84000-85000	20.7	503.7	131400	131000-132000	24.7	507.7	188700	188000-189000
16.8	499.8	85530	85000-86100	20.8	503.8	132800	132000-133000	24.8	507.8	190200	189000-191000
16.9	499.9	86590	86100-87100	20.9	503.9	134100	133000-135000	24.9	507.9	191800	191000-193000
17.0	500.0	87650	87100-88200	21.0	504.0	135400	135000-136000	25.0	508.0	193400	193000-194000
17.1	500.1	88720	88200-89300	21.1	504.1	136700	136000-137000	25.1	508.1	194900	194000-196000
17.2	500.2	89790	89300-90300	21.2	504.2	138000	137000-139000	25.2	508.2	196500	196000-197000
17.3	500.3	90880	90300-91400	21.3	504.3	139400	139000-140000	25.3	508.3	198100	197000-199000
17.4	500.4	91960	91400-92500	21.4	504.4	140700	140000-141000	25.4	508.4	199700	199000-201000
17.5	500.5	93060	92500-93600	21.5	504.5	142100	141000-143000	25.5	508.5	201300	201000-202000
17.6	500.6	94160	93600-94700	21.6	504.6	143400	143000-144000	25.6	508.6	202900	202000-204000
17.7	500.7	95260	94700-95800	21.7	504.7	144800	144000-145000	25.7	508.7	204600	204000-205000
17.8	500.8	96380	95800-96900	21.8	504.8	146200	145000-147000	25.8	508.8	206200	205000-207000
17.9	500.9	97500	96900-98100	21.9	504.9	147500	147000-148000	25.9	508.9	207800	207000-209000
18.0	501.0	98620	98100-99200	22.0	505.0	148900	148000-150000	26.0	509.0	209500	209000-210000

DEPTH = reading from gage at the Susquehanna SES Environmental Laboratory

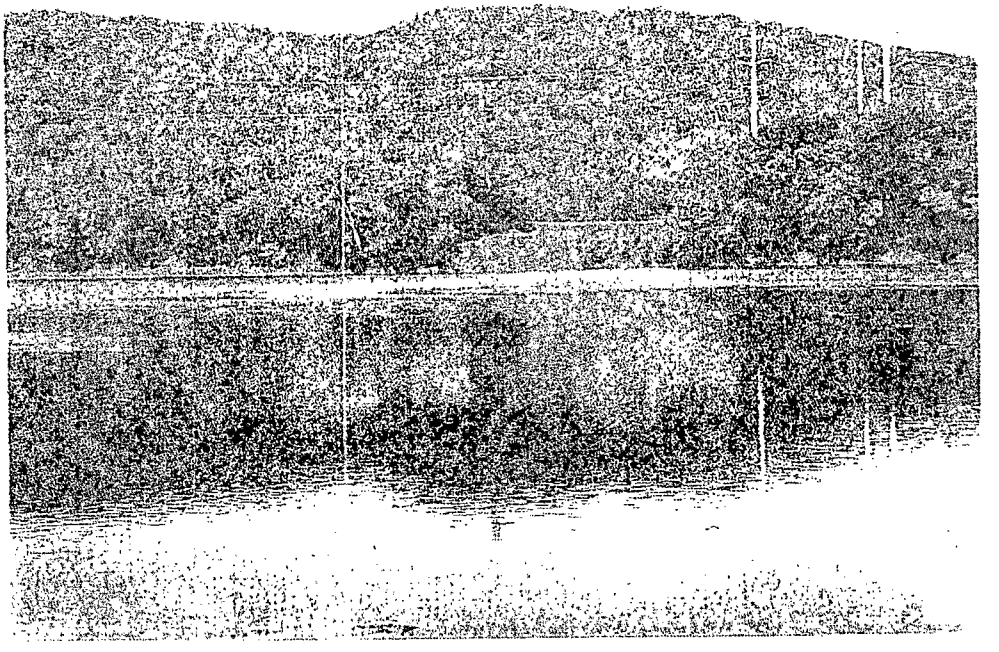
LEVEL = DEPTH + 483.0

when LEVEL $\geq$ 486.0, FLOW = 319.96989(LEVEL)^2 - 309316.24395(LEVEL) + 74753300

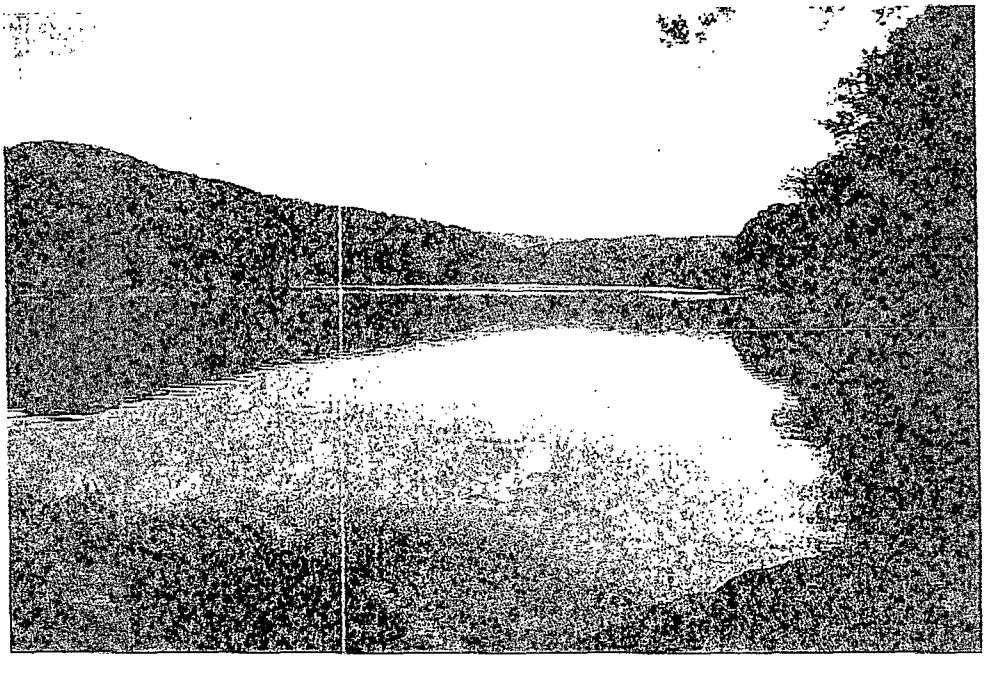
when LEVEL < 486.0, logFLOW = - 0.05251(LEVEL)^2 + 51.478501(LEVEL) - 12612.85672

FLOW RANGE denotes expected variation at the observed DEPTH.

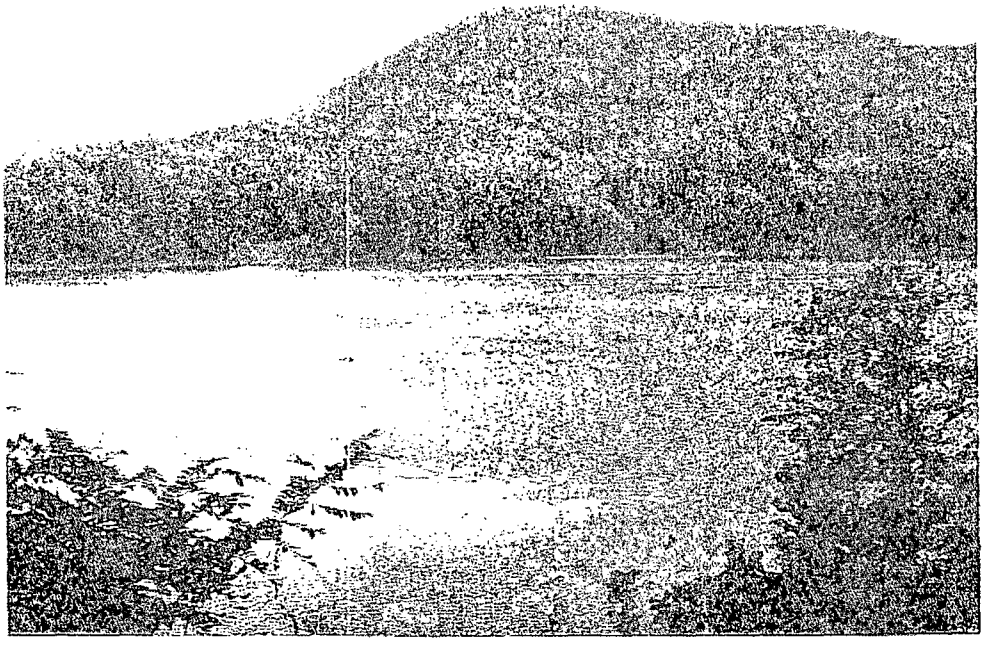
Soya, W. J. 1991. Depth-level-flow relationship of the Susquehanna River at the Susquehanna SES Environmental Laboratory. Ecology III, Inc., Berwick, PA



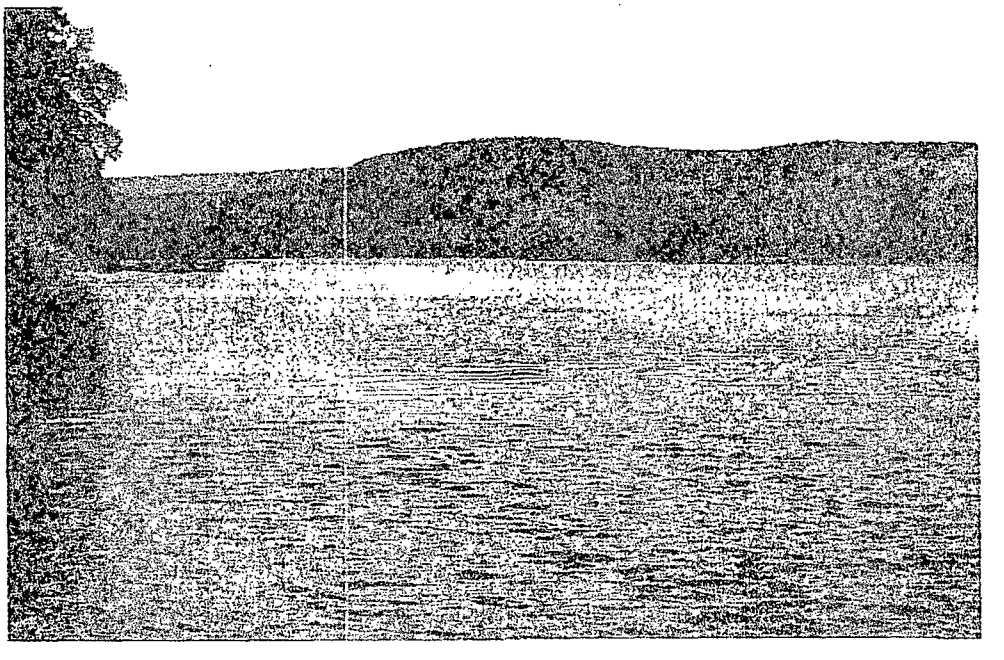
Upriver shallows looking east across river from Environmental Lab boat ramp, 8 September 2008.



River pool looking downriver from Environmental Lab boat ramp, 8 September 2008.



Downriver shallows looking east across river toward Council Cup Mountain, 8 September 2008.



River pool looking upriver from downriver shallows, 8 September 2008.

COPY

Attachment 2

Groundwater Withdrawal Application

COPY

Susquehanna River Basin Commission

a water management agency serving the Susquehanna River Watershed

RECEIVED

Ground-Water Withdrawal Application

MAY 15 2009

SRBC

General notes by PPL Bell Bend, LLC (Applicant):

- To avoid or minimize confusion, headings and instructions on the original application form are in bold font. Information and data inserted by PPL Bell Bend, LLC are in normal weight font.
- Completion of construction/installation of the dewatering system and initiation of withdrawal of groundwater is expected June 2012.

1. Applicant Information:

Company Name PPL Bell Bend, LLC (hereinafter "PPL BB")

Mailing Address 38 Bomboy Lane, Suite 2

Berwick, PA 18603

Contact Person Nancy Evans **Title** Sr. Environmental Professional

Telephone 610.774.4309 **Fax** 610.774.7136 **E-mail** naevans@pplweb.com

2. a. Location of proposed well(s):

State PA **County** Luzerne

Municipality Salem Township

b. You must attach a copy of a USGS 7 1/2 Minute Quadrangle map indicating location of proposed well(s), all existing project wells, and any nearby wells.

See Attachments GW-1, GW-2 and GW-3. Attachment GW-1 is a topographic map based on the Berwick and Sybertsville quadrangles showing the location of the BBNPP site. Attachment GW-2 shows the location of existing BBNPP site wells; all existing site wells are monitoring wells. Attachment GW-3 shows the locations of all off-site wells within five miles of the center of the BBNPP site.

3. Purpose and description of proposed withdrawal(s):

Groundwater will be withdrawn during construction of BBNPP to depress groundwater levels to facilitate the excavation of overburden and the construction of power block (Nuclear Island) components and the Essential Service Water System Emergency Makeup System (ESWEMS) pumphouse and retention pond. Excavation is expected to reach a depth of 64 ft. A groundwater flow barrier in the form of a vertical soil-bentonite slurry wall of minimum 3-ft thickness extending through the glacial overburden and keyed into competent bedrock will first be constructed on the perimeter of this area. The area enclosed by the slurry wall will be approximately 54 acres. Extensive quality control measures will be taken to ensure that the slurry wall is constructed without gaps or windows.

2009-078

ENTERED
Date: 5/15/09
Initials: BEW

Approximately 30 dewatering wells will be installed along and inside of the slurry wall. Each dewatering well will extend into competent shale bedrock. The individual well pumps will be rated up to 150 gpm. The slurry wall will minimize both the quantity of water to be withdrawn and the effect of the withdrawal on groundwater levels outside the slurry wall. Groundwater withdrawal is not expected to affect any off-site well.

Drawdown of the groundwater level within the slurry wall enclosure is expected to take two (2) to three (3) months. The average well system withdrawal rate is expected to be 2.6 mgd during this period. Because of uncertainty in the actual hydrology and the construction schedule duration for the drawdown, the drawdown time may need to be compressed. The estimated maximum rates of combined groundwater withdrawal by the dewatering well system are 3.3 mgd as a 30-day average and 3.7 mgd on any day. Following initial drawdown, continuous withdrawal to control steady-state inflow during construction of the component foundations is expected to occur at a nominal rate of 110 gpm (0.16 mgd).

Results of model studies of the groundwater, slurry wall and dewatering well system can be made available to the Commission, if desired.

The majority of the groundwater withdrawn by the dewatering well system will be discharged off-site in accordance with an NPDES permit to be obtained from PA DEP. A relatively small amount of the water withdrawn by the well system is expected to be used during construction for dust control and embankment construction, and possibly for concrete mixing if water quality is adequate. Approval for consumptive use of this water is included in the application for consumptive water use accompanying this application. If the dewatering well system does not supply water sufficient in quality and quantity for construction purposes, additional water will be obtained off-site and, if necessary, will be permitted separately. Potable and sanitary water needed during plant construction and operation is expected to be provided by the local purveyor.

The dewatering well system could be operated for approximately three years during construction. Prior to completion of construction, it is expected that the dewatering well system will be abandoned; the majority of the dewatering wells will be pressure-grouted shut. Some of the wells may be retained to provide a means of controlling groundwater table levels during operation (not anticipated to be necessary at this time).

Other than the withdrawal by the dewatering well system during construction, no other on-site groundwater withdrawal during construction or operation of the plant is anticipated at this time.

4. Requested withdrawal from proposed well(s) (based on a 30-day average):

The dewatering well system will include approximately 30 wells, with a combined requested withdrawal of 3.3 mgd as a 30-day average, as explained in 3, above. The individual wells of the system may have pumping capacities of up to 150 gpm (0.22 mgd), to be determined, but simultaneous pumping by the dewatering system wells will be controlled so as not to exceed the requested system withdrawal. Maximum withdrawal by the system will be temporary, expected not to exceed two (2) to three (3) months in duration.

5. Total combined withdrawal from proposed well(s) (based on a 30-day average):

The requested maximum combined withdrawal from the dewatering well system is 3.3 mgd based on a 30-day average. This is a conservative requested maximum based on an anticipated maximum withdrawal rate of 2.6 mgd during the 2- to 3-month dewatering period. The maximum dewatering system withdrawal rate may be limited by the maximum discharge allowed by the NPDES permit.

6. Existing and projected total water use:

Note [A]: Groundwater withdrawal is expected to occur only during project construction. Accordingly, the table from the application form has been modified, below, and water usage data presented in the table pertain only

to the project construction period. Water usage during project operation is addressed in the accompanying surface water withdrawal application.

Water Usage See Note [A] above	Construction Period Quantity/Rate See Note [A] above	Project Design Year Quantity/Rate See Note [A] above
Average Daily Groundwater Withdrawal	0.16 mgd after dewatering period (see 3 above)	Not applicable
Maximum Groundwater Withdrawal	3.7 mgd (peak day) and 3.3 mgd (30-day average) over a two- to three-month dewatering period	Not applicable
Dewatering Well System Capacity	The sum of the individual capacities of the dewatering wells, to be determined, may be as high as approximately 4,500 gpm (6.5 mgd). However, operation of the dewatering system will be controlled so that the aggregate discharge of the dewatering system will not exceed the rate requested.	Not applicable. The dewatering well system will be abandoned prior to the completion of construction.

Explanation

[1] **Project water usage should be on an annual basis, unless the application is for a seasonal operation. For seasonal uses, indicate the duration of the use (the number of months on which the average is based).** (Not applicable to the table as modified)

[2] **For new projects, the existing use should be the proposed use during the first year of operation.** (Not applicable to the table as modified)

[3] **The projected use should be for 25 years in the future (design year). If the project duration is less than 25 years, indicate the year for which projections were made.** (Not applicable to the table as modified)

[4] **The existing system capacity should not include the proposed sources unless the application is for a new project having no prior withdrawal.** (Not applicable to the table as modified)

7. Existing sources of water:

a. Wells (table deleted)

The project will be a new facility. No wells presently provide water to the site. As described above, a system of dewatering wells will be developed for construction purposes.

b. Other sources of water (stream intakes, interconnections, reservoirs, springs, etc.): (table deleted)

The project will be a new facility. No other sources presently provide water to the site. The majority of water during operation will be withdrawn from the Susquehanna River; an application for approval of that withdrawal accompanies this application for groundwater withdrawal. During construction and operation, potable water

is expected to be obtained from the Pennsylvania American Water Company (Berwick District) municipal supply system.

8. **Well record (proposed well(s)):** (data outline deleted)

All new wells will be components of the dewatering system described in 3, above. Information required by the Commission will be provided upon installation, testing and operation of the dewatering system. The discharge from each well will be continuously metered and controlled. The wells will cease to operate prior to completion of project construction.

9. **Existing nearby wells:**

Attach map identifying all nearby wells owned by others that could be affected by pumpage of the proposed well(s) and complete items below for each well. (data outline deleted)

The locations of existing on-site monitoring wells and well clusters are shown on Attachment GW-2. The on-site wells comprise a system of 41 monitoring wells generally installed and monitored monthly beginning October 2007:

- 14 screened in glacial overburden, 9.2 to 76.0 ft deep
- 19 screened in shallow bedrock, 50 to 181 ft deep
- 8 screened in deeper bedrock, 170 to 400 ft deep

Groundwater withdrawal by the proposed dewatering wells will be from within the area confined by the slurry wall and is not expected to affect any offsite well. Nevertheless, the locations of known existing wells within five miles of the center of the BBNPP site are shown on Attachment GW-3.

10. **Driller's log:**

Attach separate sheet describing the nature and depth interval of subsurface materials and water-bearing zones penetrated during drilling of each proposed well.

The relevant subsurface materials in the area to be dewatered are glacial sand and gravel overlying shale bedrock. The overburden is up to 65 feet in depth.

The proposed wells will be drilled and tested by one or more licensed well drillers. Logs will be furnished as they become available.

11. **Pumping test:**

NOTE: Review and approval by the Susquehanna River Basin Commission of the test procedures to be used by the applicant are necessary before the test is started.

Attach copies of basic data sheets and any resultant water level charts, tables, graphs, etc., for the pumped well, monitoring wells, and nearby perennial stream sites. The pumping test shall be of not less than 48 hours pumping duration and at a constant withdrawal rate not less than the proposed rate. A step-drawdown pumping test may precede the 48-hour test, however, water levels should be allowed to essentially recover prior to the constant rate test. The following information from the test is generally required:

a. **Date and time of all static, pumping, and recovery water level measurements.**
b. **Record of pumping rate measured frequently throughout the test.**

c. **Sufficient static water level measurements in all wells to determine any trends in water level changes prior to the beginning of pumping. All water levels are to be measured to an accuracy of one-tenth of a foot.**
d. **Pumping and recovery measurements from the pumped well.**
e. **Monitoring data from a sufficient number of wells to determine all possible interference.**
f. **Records of precipitation, measurements or observations of nearby streamflows, and weather conditions throughout the test.**

The proposed dewatering wells will be drilled following construction of the confining slurry wall. Additional monitoring wells will likely be required outside of and along the slurry wall to monitor its effectiveness. The dewatering wells will be tested, with groundwater levels observed in the existing and proposed monitoring wells during the tests. PPL BB will provide the Commission with its plan to test the dewatering well system prior to such testing. At such time as the proposed wells are installed and tested, the information required in this section that is relevant to the system will be provided to the Commission. PPL BB anticipates a piezometric monitoring program that will allow a comparison of withdrawals and drawdown rates to those calculated in advance, in order to determine the existence of discontinuities in the slurry wall and the need for potential remedial measures.

12. **Preparer:**

Name Jan C. Phillips, P.E.

Title Consulting Engineer

Company NA

Address 2611 Walnut Street, Allentown, PA 18104

Phone 610.821.0160 **Fax** 610.821.0160

Signature Jan C Phillips

Date 5-6-09 **E-mail Address** jcphllps@enter.net

13. **Applicant:**

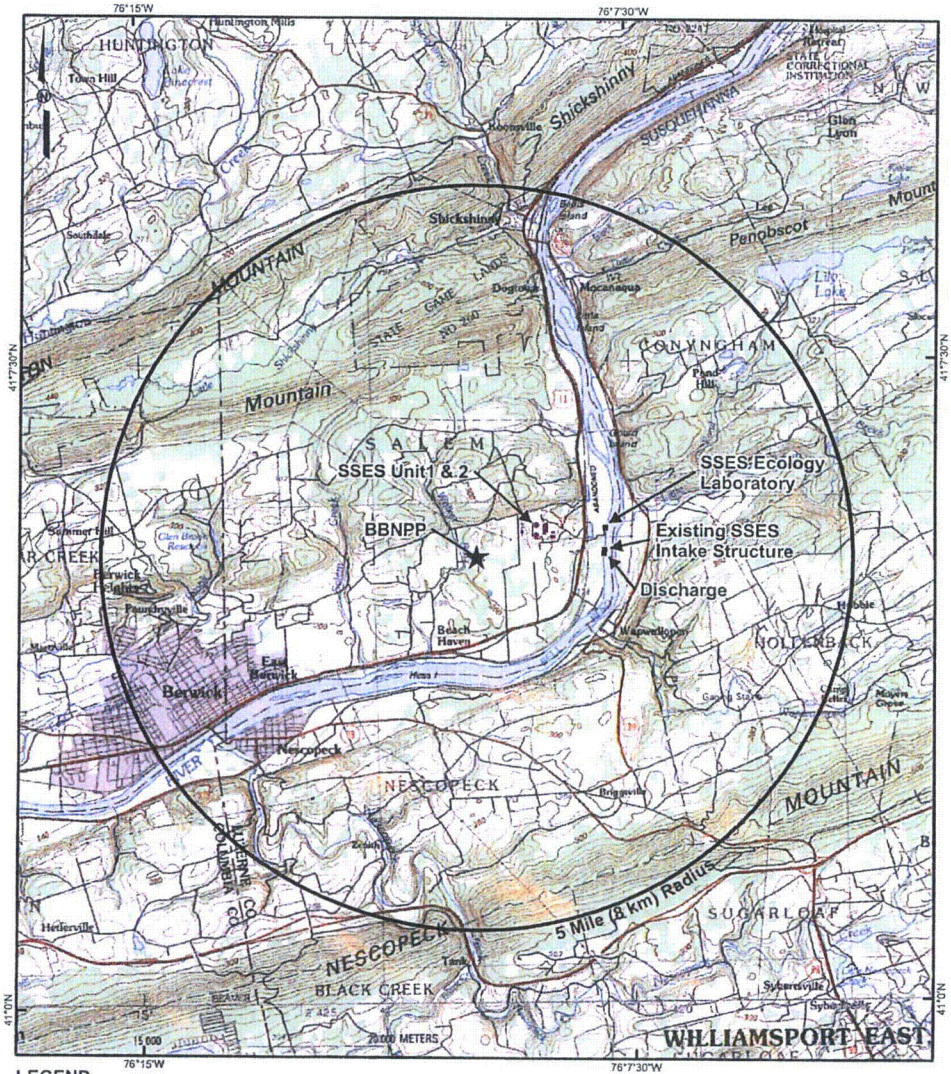
Name (print or type) Terry L. Harpster **Title** ~~Vice~~ President-Bell Bend Project - Development

Signature T L Harpster **Date** 05-13-09

K:\DATA\JPAIN\WORD\FORMS\SRBC\24G (Ground-Water Instructions and Application).DOC

ATTACHMENT GW-1

Figure 2.3-2 {Site Area Topographic Map 5 Mile (8 km) Radius}



REFERENCE:
USGS 1:100K Topographic Maps:
Williamsport East and Sunbury.Maps edited 1984.

ATTACHMENT GW-2

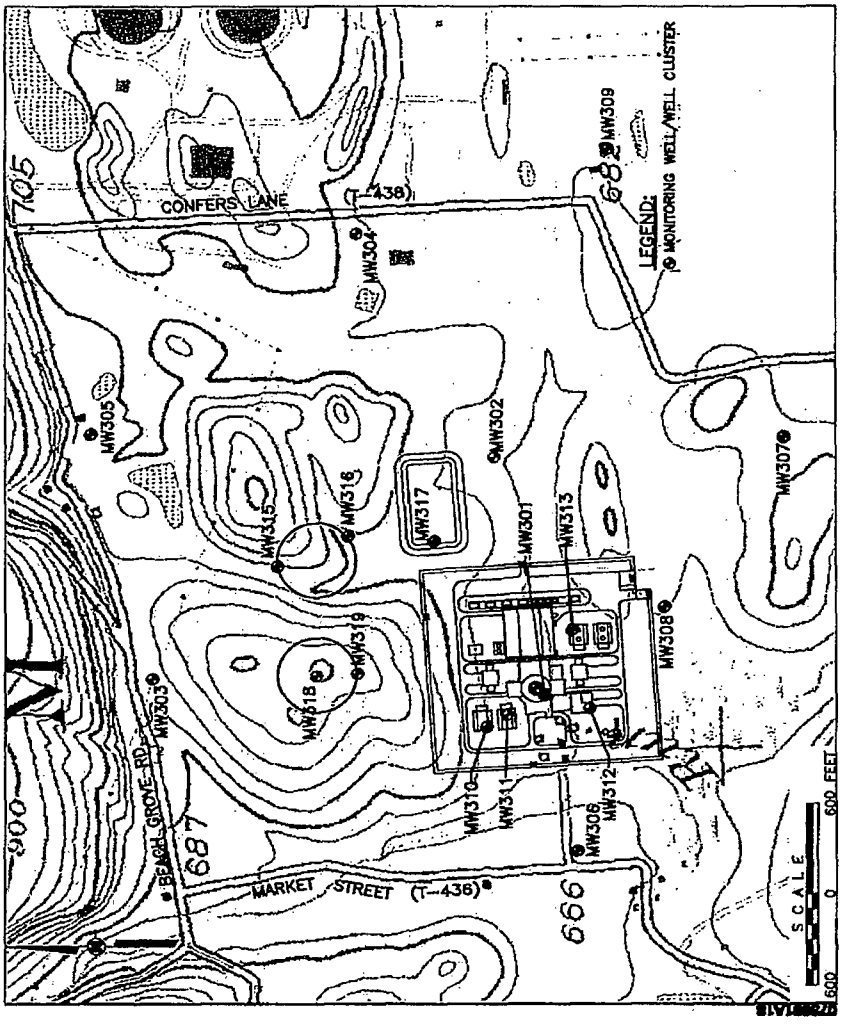
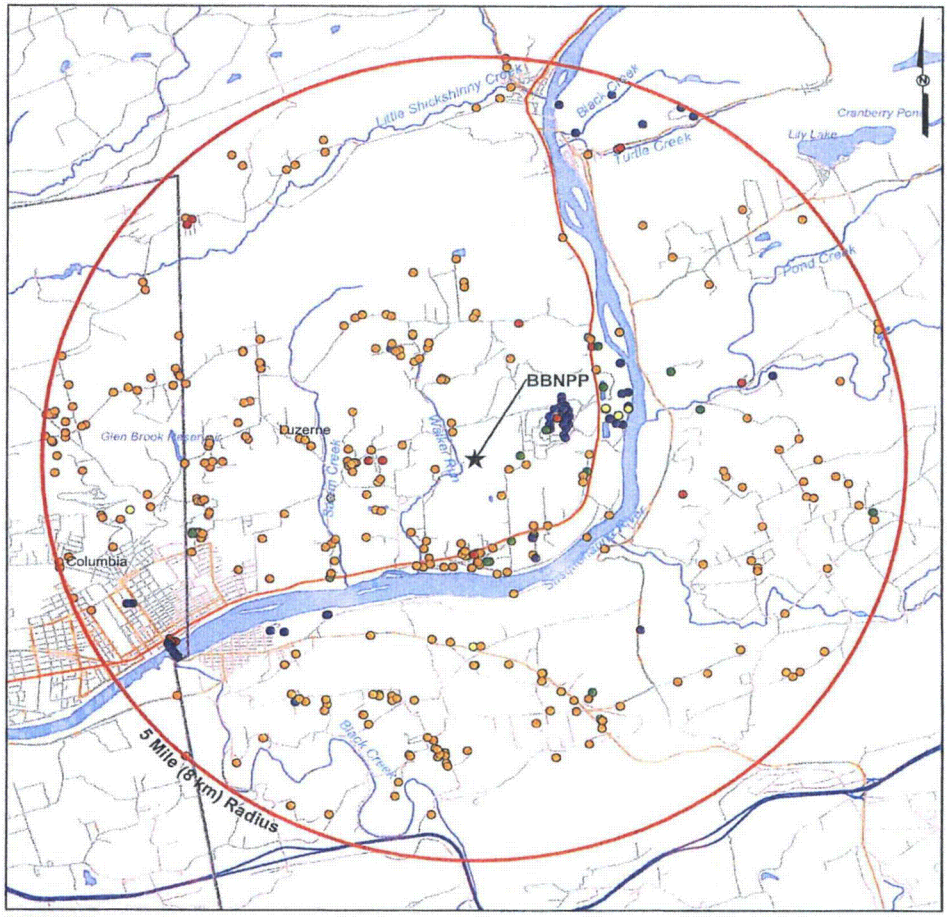


Figure 2.3-32 {Locations of Groundwater Monitoring Wells}

ATTACHMENT GW-3

Figure 2.3-73 {Groundwater Well Locations within a 5-Mile (8-km) Radius}



LEGEND

★ Center Point of Proposed Bell Bend NPP (BBNPP)

Groundwater Well Location (PaGWIS, 2008)
- Public Supply Use
- Commercial Use
- Industrial Use
- Other Use
- Domestic Use

NPP Reactor 5 Mile (8 km) Radius
County Boundary
Interstate
Secondary State and County Highway
Local, Neighborhood, Rural, or City Street
Streams and Rivers
Waterbody

0 0.5 1 2 Miles
0 0.5 1 2 Kilometers

REFERENCE
- ESRI StreetMap Pro [CD-ROM], 2007,rivers, waterbodies, and county boundaries.
- PA Topographic & Geologic Survey, Pa Groundwater Information System (PaGWIS). http://www.dcnr.state.pa.us/topogeo/groundwater/ Database Accesses February 2008.

COPY

Attachment 3

Surface Water Withdrawal Application

COPY

Susquehanna River Basin Commission

a water management agency serving the Susquehanna River Watershed

Surface Water Withdrawal Application

General notes by PPL Bell Bend, LLC (Applicant):

- To avoid or minimize confusion, headings and instructions on the original application form are in bold font. Information and data inserted by PPL Bell Bend, LLC are in normal weight font.
- Withdrawal of surface water for purposes of pre-operational testing of BBNPP is expected to begin in January 2017.

1. **Applicant Information:**

Company Name PPL Bell Bend, LLC (hereinafter "PPL BB")

Mailing Address 38 Bomboy Lane, Suite 2

Berwick, PA 18603

Contact Person Nancy Evans **Title** Sr. Environmental Professional

Telephone 610.774.4309 **Fax** 610. 774.7136 **E-mail** naevans@pplweb.com

2. a. **Location of proposed source(s):**

State PA **County** Luzerne

Municipality Salem Township

b. **You must attach a copy of a USGS 7 1/2 Minute Quadrangle map indicating location of proposed intake(s), all existing project sources, and any water storage facilities.**

Attachment SW-1 is a topographic map based on the Berwick and Sybertsville quadrangles showing the location of the BBNPP site. Attachment SW-2 is a plan of BBNPP including the river intake and discharge diffuser and the plant water storage facilities.

3. **Purpose of proposed withdrawal(s):** The purpose of the proposed withdrawal is to provide water for operation of the proposed Bell Bend Nuclear Power Plant (BBNPP). Except for a small fraction of the required water (potable/sanitary water to be purchased from and delivered by Pennsylvania American Water Company, Berwick Division), all water needed for BBNPP operation will be withdrawn from the Susquehanna River. No water will be withdrawn from the River for construction.

Provide method of computation for the safe yield estimates of all sources of water supply or submit copies of flow or pumping test data. (See Application Sections 4 and 8.) For all run-of-stream sources and sources with limited storage, compute 7-day, 10-year low flow (Q7-10) using low flow statistical data and appropriate hydrologic engineering techniques. Whenever an intake is located on an ungaged stream, the applicant must use an acceptable method for computing the safe yield or Q7-10, such as selecting a reference U.S. Geological Survey gaging station and proportioning the yield based on drainage area. The selected gaging station must be on a watershed having similar geologic and climatic characteristics to those of the ungaged watershed. Other factors to consider are relative size of drainage areas and whether the reference gaging station is influenced by upstream reservoirs or other flow regulation activities. Up-to-date low flow data for specific gaged watersheds may be obtained from the U.S. Geological Survey district offices. Actual flow data collected at the project intake may be used to supplement the use of a reference gaging station. Any data provided should indicate the method used to measure the flow (current meter, weir, etc.), the dates of observation and the flow observed. In application Section 6, show calculation for determining the quantity of withdrawal requested for present and future use (over the next 25 years). Describe alternate sources of supply considered in lieu of requesting a new or increased withdrawal for the sources listed in Application Section 4.

4. Source(s) from which withdrawal is being requested:

Name of Source	Quantity of Withdrawal Requested		Safe Yield or Q7-10 Low Flow[2] at Point of Taking (mgd[1])	Drainage Area (square miles)	Location of Taking Point (latitude/longitude)
	Maximum 30-Day Average (mgd[1])	Maximum Day (mgd[1])			
Susquehanna River	NA	44 mgd[3]	530 mgd[4]	Approx. 10,240 sq mi[5]	N 41° 05′ 13.9″ W 76° 07′ 53.1″
Total	NA	44 mgd[3]	530 mgd[4]		

[1] **mgd = million gallons per day**

[2] **Use acceptable hydrologic practices in determining 7-day, 10-year low flow.**

[3] Quantities shown do not include allowance for measurement error.

[4] A Q7-10 flow of 814 cfs (526 mgd) at the USGS gage at Wilkes-Barre (No. 01536500) has been used by the Commission in determining the need for consumptive use compensation release from Cowanesque Reservoir. The Commission's "Consumptive Use Mitigation Plan" (2008) presents the Q7-10 flow at Wilkes-Barre as 820 cfs (530 mgd). The Wilkes-Barre gage is approximately 20 miles upstream from the proposed BBNPP river intake. At the Wilkes-Barre gage, the 90-percent exceedance flow is 1,670 cfs, the minimum seven-day low flow is 546 cfs (September 1964) and the minimum daily flow is 532 cfs (September 1964).

[5] The drainage area at the Wilkes-Barre gage is 9,960 square miles. The drainage area at the USGS gage at Danville, PA (No. 01540500), approximately 26 miles downstream of the proposed BBNPP river intake, is 11,200 square miles.

5. Prior or pending state or federal permits:

Numerous state and federal permits will ultimately be required for BBNPP; several are related to water use or water resources. The principal approval will be the Combined License (COL) to be issued by the USNRC for plant construction and operation; PPL BB filed its application to the USNRC for the COL on October 10, 2008. Applications for other state and federal permits have not yet been filed.

The table below lists required permits related to water use or water resources, including those listed in the form but not applicable to BBNPP.

Permit Name	Status[1]	Agency	Permit Issue Date	Permit Number
Construction and Operating License	P	U.S. Nuclear Regulatory Commission		
Encroachment or Water Obstruction Permit (Chapter 105: river work, Walker Run relocation) – joint permit with CWA section 404, below	R	PA DEP		
CWA Section 404 Permit(s) (river work, Walker Run relocation, wetlands) – joint permit with Water Obstruction Permit, above	R	U.S. Army Corps of Engineers		
NPDES (discharges to river, Walker Run)	R	PA DEP		
Flood Plain Letter of Map Revision	R	FEMA, Salem Township		
Water Allocation/Appropriation Permit	NA			
Safe Drinking Water Permit	NA			
Dams Permit	NA			

[1] **If not applicable list (NA); if pending, (P); if required but not applied for, (R)**

6. **Show by <u>calculation</u> how the "Quantity of Withdrawal Requested" was determined.**
Approval of a withdrawal of 44 mgd (peak day basis) is requested. The calculation of this quantity is presented as Attachment SW-3.

The allocation requested is considered sufficient to meet the future needs of Bell Bend. At this time, PPL BB does not foresee a need to modify plant design or operation such that an increase in the quantity of withdrawal requested would be required.

No sources other than the Susquehanna River were considered as the primary source of water for operation of Bell Bend, and no other source or combination of sources are adequate.

7. **Existing and projected total water use:**

Note [A]: Surface water withdrawal will occur only during project operation. There is no expectation that water usage will increase during the operating life of the project. Accordingly, the table from the application form has been modified, below, and water usage data presented in the table pertain to the extended project operation period. Water usage during project construction is addressed in the accompanying ground water withdrawal application. Potable and sanitary water needed during operation is expected to be provided by the local purveyor at an average rate during normal operations of approximately 0.15 mgd.

Note [B]: The river intake includes six pumps: three pumps (each rated at 13,100 gpm) will be components of the Circulating Water System Makeup Water System (CWSMWS); and three pumps (each rated at 2,900 gpm) will be components of the Raw Water Supply System (RWSS). The nominal total intake capacity is equivalent to 48,000 gpm (69.1 mgd). However, no scenario is envisioned during which river water withdrawal would exceed 29,100 gpm (41.9 mgd), which is the combined rated capacity of two CWSMWS pumps and one RWSS pump.

Water Usage See Note [A] above	Operation Period Quantity/Rate See Note [A] above
Average Daily Water Demand	38 mgd
Maximum Daily Water Demand	44 mgd
System Capacity	See Note [B] above

[1] **Project water usage should be on an annual basis, unless the application is for a seasonal operation. For seasonal uses, indicate the duration of the use (the number of months on which the average is based).** (Not applicable to the table as modified)

[2] **For new projects, the existing use should be the proposed use during the first year of operation.** (Not applicable to the table as modified)

[3] **The projected use should be for 25 years in the future (design year). If the project duration is less than 25 years, indicate the year for which projections were made.** (Not applicable to the table as modified)

[4] **The existing system capacity should not include the proposed sources unless the application is for a new project having no prior withdrawal.** (Not applicable to the table as modified)

8. **Existing sources of water:**

a. **Wells** – None/NA

Well Identification	Frequency of Use[1]	Purpose[2]	Well Depth (ft)	Cased Depth (ft)	Screened Interval (ft to ft)	Existing Pump Capacity (mgd)	Number of Days Used During Calendar Year	Metered (yes/no)	Average Daily Withdrawal (mgd)	Safe Yield[3]
								Total		

[1] Indicate if well is used on Regular (R), Auxiliary (A), or Emergency (E) basis.
[2] Indicate purpose such as potable supply, non-contact cooling, or water quality remediation.
[3] Provide method of computation or submit copies of pumping test data.

b. **Other sources of water (stream intakes, interconnections, reservoirs, springs, etc.)** – None/NA

Name	Description	Frequency of Use[1]	Purpose[2]	Drainage Area, If Applicable (square miles)	Existing Pump Capacity[3] (mgd)	Number of Days Used During Calendar Year	Metered (yes/no)	Average Daily Withdrawal (mgd)	Safe Yield or Q7-10 Low Flow[4] (mgd)
							Total		

[1] Indicate if source is used on Regular (R), Auxiliary (A), or Emergency (E) basis.
[2] Indicate purpose such as potable supply, process water, non-contact cooling, or irrigation.
[3] If gravity-fed, give maximum hydraulic capacity and label as such.
[4] Provide method of computation for 7-day, 10-year low flow for run-of-stream sources.

9. **Raw water ponds, lakes, intake dams, and storage dams (existing and/or proposed)** – None/NA

Name	Year Constructed	Year of Last Sedimentation Survey	Storage Capacity (mg)	Surface Area (acres)	Drainage Area (sq mi)	Release Works[1] (yes)	Release Works[1] (no)

[1] **Does the dam have facilities to provide a release of water to the stream when water is not flowing over the spillway or top of dam? If yes, describe length, diameter, depth, valving, etc.**

10. **Preparer:**

Name Jan C. Phillips, P.E.

Title Consulting Engineer

Company NA

Address 2611 Walnut Street, Allentown, PA 18104

Phone 610.821.0160 Fax 610.821.0160

Signature Jan C. Phillips

Date 5-6-09 **E-mail Address** jcphllps@enter.net

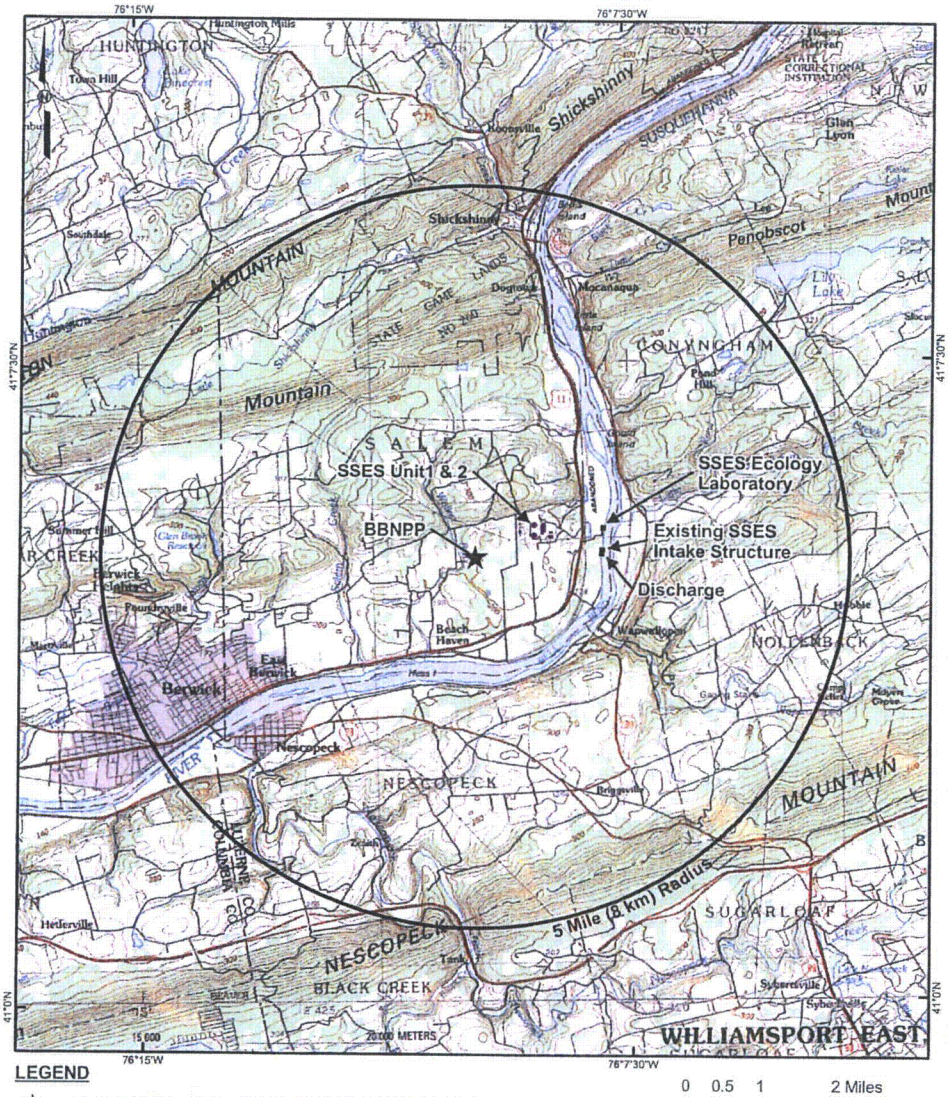
11. **Applicant:**

Name (print or type) Terry L. Harpster **Title** Vice President-Bell Bend Project - Development

Signature T L Harpster **Date** 05-13-09

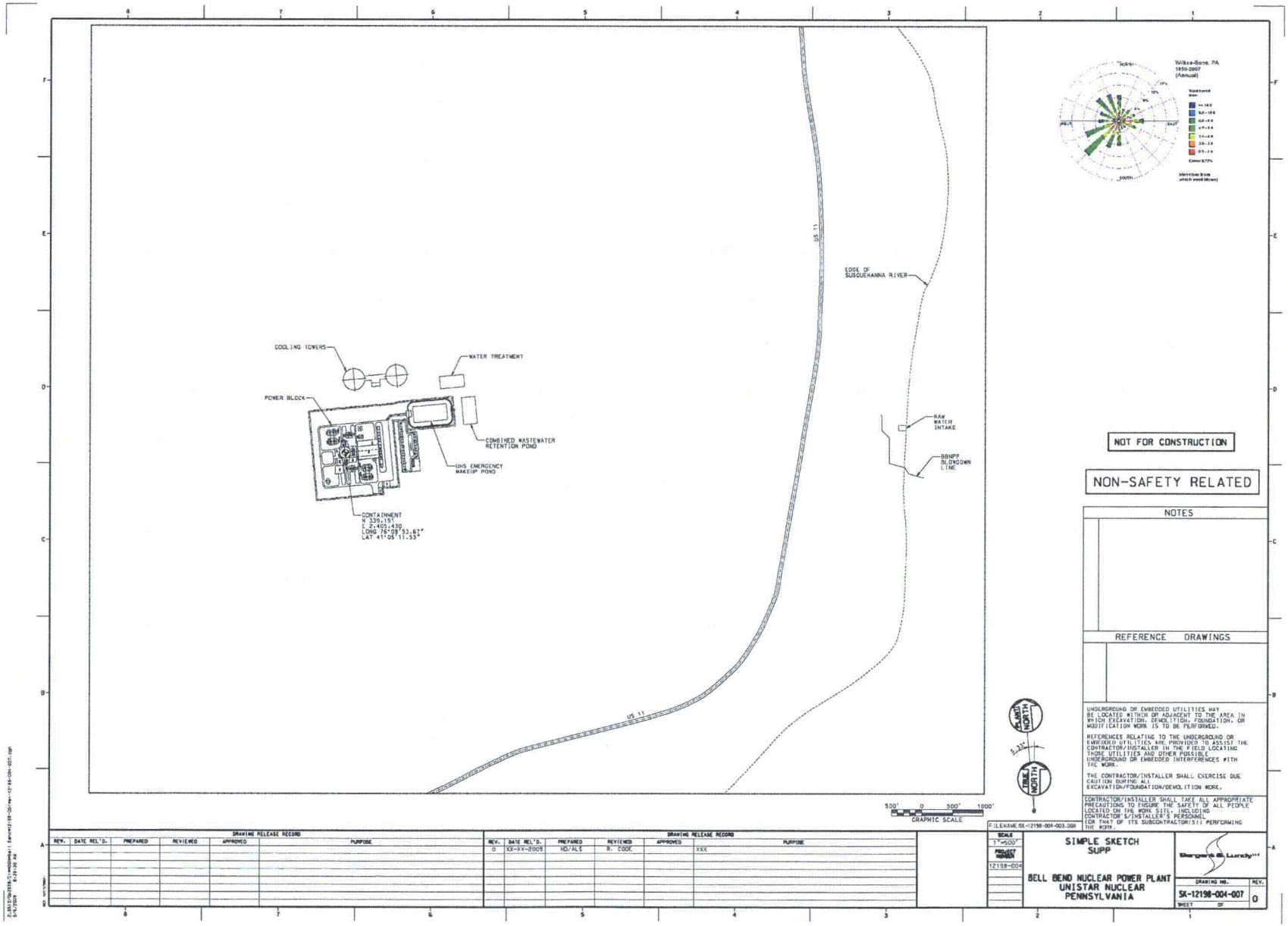
ATTACHMENT SW-1

Figure 2.3-2 {Site Area Topographic Map 5 Mile (8 km) Radius}



REFERENCE:
USGS 1:100K Topographic Maps:
Williamsport East and Sunbury.Maps edited 1984.

ATTACHMENT SW-2



ATTACHMENT SW-3

CALCULATION OF QUANTITY OF WITHDRAWAL REQUESTED

PPL Bell Bend, LLC is requesting the SRBC to approve withdrawal of up to 44 mgd (peak day) from the Susquehanna River, Salem Township, Luzerne County, PA. This attachment to the application describes how the requested withdrawal quantity was calculated.

Attachment SW-3-A to Attachment SW-3 is the BBNPP "Anticipated Water Use Diagram" showing the main plant water uses and flows coincident with the anticipated peak day withdrawal from the Susquehanna River and peak day consumptive water use. Reference to Attachment SW-3-A is suggested in reviewing this description of the calculation of the withdrawal quantity.

As explained below, the quantity of withdrawal requested includes an allowance to account for variability within the range of monitoring accuracy required by the Commission. However, the anticipated peak day withdrawal and peak day consumptive water use shown on Attachment SW-3-A are the amounts calculated, without such allowance.

Attachment SW-3-A shows two systems that withdraw water from the Susquehanna River for BBNPP use. One is the Circulating Water System Makeup Water System (CWSMWS). The CWSMWS will convey river water into a closed cooling system, which will utilize two natural draft counter-flow cooling towers to remove heat from the water after passing through the plant's steam condenser. Evaporation is lost in the CWS cooling towers and this increases the level of solids in the circulating water. To control solids, a portion of the re-circulated water will be removed through the CWS blowdown and replaced with water through the CWSMWS. In addition, there is a small loss for drift of the cooling tower spray. The CWSMWS provides makeup to account for the cooling tower evaporation, blowdown and drift.

The other system withdrawing water is the Raw Water Supply System (RWSS). The RWSS will supply water to the Demineralized Water System, Fire Water Distribution System, Essential Service Water System (ESWS) and the ESW Emergency Makeup System Retention Pond. The ESWS will feature four, closed cooling systems. Each of the four systems will utilize two mechanical draft cooling towers to dissipate heat from the ESWS. Just as in the case of the main cooling towers, the RWSS provides makeup to ESWS to account for the cooling tower evaporation, blowdown and drift. The RWSS also supplies makeup to the ESW Emergency Makeup System Retention Pond to account for surface evaporative loses from the pond.

The expected maximum withdrawal for CWSMWS would occur with the plant at 100% power, worst-case meteorological conditions and a blowdown flow to maintain 3.0 cycles

of concentration. The expected maximum withdrawal for RWSS would occur when the plant is shutting down. Because the maximum withdrawal scenarios for the CWSMWS and the RWSS are mutually exclusive, i.e. 100% power cannot exist during plant shutdown, the maximum withdrawal condition will be based on CWSMWS supporting the plant at 100% power, worst-case meteorological condition and a blowdown flow to maintain 3.0 cycles of concentration, and RWSS supplying loads that are expected for 100% power operation (one ESWS with two cooling towers operating).

With the above information as a basis, the maximum daily (peak day) withdrawal is calculated as described below.

CWSMWS

For CWSMWS assume worst-case meteorology i.e., 77°F wet-bulb temperature and 40% relative humidity conservatively applied for the entire 24-hour period. Information from the cooling tower manufacturer indicates a corresponding evaporation rate of 8,860 gpm and a total evaporation loss for two towers of 8,860 x 2 = 17,720 gpm. Blowdown rates are determined by:

(Blowdown + drift) = (evaporation)/(cycles-1)

A conservative estimate of 3.0 cycles of concentration will be used. Cooling tower drift is estimated as 4 gpm per tower or 8 gpm. Then

(Blowdown + 8 gpm) = 17,720 gpm/(3.0-1) [two towers]
Blowdown = 8,852 gpm [two towers]

CWSMWS Total Withdrawal = Evaporation + Blowdown + Drift
= 17,720 gpm + 8,852 gpm + 8 gpm
= 26,580 gpm (38.3 mgd)

RWSS

For RWSS the maximum withdrawal that would coincide with the maximum CWSMWS withdrawal is 1,921 gpm (2.8 mgd). This value is considered a maximum because of the very conservative makeup flows to ESWS.

The RWSS withdrawal has the following components:

ESWS cooling tower evaporation: 571 gpm per tower = 1,142 gpm [two towers]
ESWS cooling tower drift: 2 gpm per tower = 4 gpm [two towers]
ESWS cooling tower blowdown at 3.0 cycles of concentration:
(Blowdown + 4 gpm) = 1,142 gpm/(3.0-1)
Blowdown = 567 gpm [two towers]
Subtotal: ESWS cooling towers = Evaporation + Blowdown + Drift
= 1,142 gpm + 567 gpm + 4 gpm = 1,713 gpm [two towers]

RWSS Filter Backwash = 91 gpm
Demineralized Water Distribution System = 107 gpm
Fire Water Distribution System = 5 gpm
Floor Wash Drains = 5 gpm

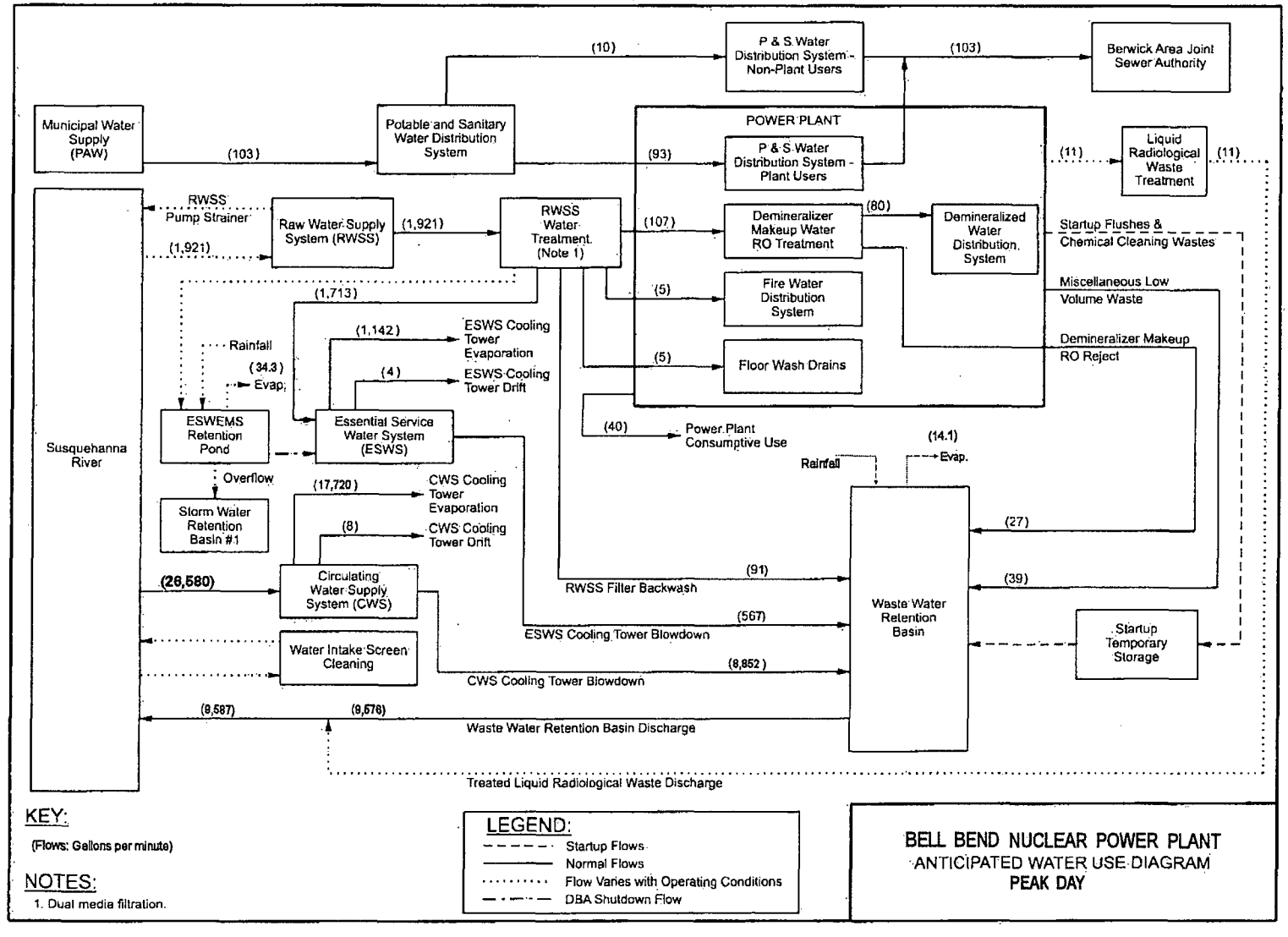
Total RWSS withdrawal
= 1,713 gpm + 91 gpm + 107 gpm + 5 gpm + 5 gpm = 1,921 gpm

Plant (CWSMWS + RWSS)

Max. Daily Withdrawal = Max. Daily Withdrawal (CWSMWS + RWSS)
= 26,580 gpm (38.3 mgd) + 1,921 gpm (2.8 mgd)
= 28,501 gpm (41.1 mgd)

For this application, 41.1 mgd is rounded up to 44 mgd for conservatism and to account for variability within the range of monitoring accuracy required by the Commission.

ATTACHMENT SW-3-A



COPY

Attachment 4

Consumptive Water Use Application

SRBC #24C
Rev. 9/99

COPY

Susquehanna River Basin Commission

a water management agency serving the Susquehanna River Watershed

RECEIVED
MAY 15 2009
SRBC

Consumptive Water Use Application

General note by PPL Bell Bend, LLC (Applicant):

- To avoid or minimize confusion, headings and instructions on the original application form are in bold font. Information and data inserted by PPL Bell Bend, LLC are in normal weight font.

1. Project Sponsor Information:

Company Name PPL Bell Bend, LLC (hereinafter "PPL BB")

Mailing Address 38 Bomboy Lane, Suite 2

Berwick, PA 18603

Contact Person Nancy Evans Title Sr. Environmental Professional

Telephone 610.774.4309 Fax 610.774.7136 E-mail naevans@pplweb.com

2. Company or Facility Description:

Type of facility Electric generating station

Date operations began or will begin Testing and preparation for commercial operation is expected to begin 2018.

Consumptive water use during construction is expected to begin June 2012.

3. a. Location of Facility:

State PA County Luzerne

Municipality Salem Township

c. You must attach a copy of a USGS 7 ½ minute quadrangle map indicating the location of the facility, all water resources, and discharges. Please indicate quadrangle name.

Attachment CU-1 is a topographic map based on the Berwick and Sybertsville quadrangles showing the location of the BBNPP site. Attachment CU-2 is a plan of BBNPP including the river intake and discharge diffuser and the plant water storage facilities.

2009-080
ENTERED
Date: 5/15/09
Initials: BEW

4. Water Sources (s) (well, spring, stream, public supply, etc.)

Source	Location
Susquehanna River (operation only)	Salem Township, Luzerne County, PA. See Attachment CU-1 for location of proposed river intake.
On-site dewatering wells (construction only)	BBNPP site. Ref. accompanying Ground-Water Withdrawal application. Some water withdrawn from the system of dewatering wells will be used consumptively. The estimated maximum consumptive use of groundwater is 0.12 mgd.
Pennsylvania American Water Company	Extension of existing system (Berwick Division) to site
Trucked-in water (if necessary, construction only)	Source unknown at this time

5. Water Requirements:

Water Use	Prior to January 23, 1971	January 23, 1971, to Present	Future Use (25 years)
	gallons per day		
Maximum Daily Total Withdrawal	NA	NA	44 mgd [Note A}
Maximum Daily Consumptive Use	NA	NA	31 mgd [Note B]
Maximum Average Daily Consumptive Use*	NA	NA	26 mgd [Note C]

*based on maximum consecutive 30-day period

Note A: 41.1 mgd is the calculated amount. PPL BB is applying for 44 mgd.
Note B: 27.3 mgd is the calculated amount. PPL BB is applying for 31 mgd.
Note C: 25.9 mgd is the calculated amount. PPL BB delineates the value as 26 mgd.

6. Metering:

Inflow to the facility √ yes _____ no Effluent √ yes _____ no

7. Provide method of computing consumptive use.
See Attachment CU-3 for computation of both the estimated maximum daily consumptive use and the estimated maximum 30-day average consumptive use.

8. **Provide flow chart showing the movement of water through the facility, including location and amount of any losses.** Attachment CU-4 is the BBNPP "Anticipated Water Use Diagram" showing the main plant water uses and flows coincident with the anticipated peak day withdrawal from the Susquehanna River and peak day consumptive water use. As explained in Attachment CU-3, the quantity of consumptive use requested includes an allowance to account for variability within the range of monitoring accuracy required by the Commission. However, the anticipated peak day withdrawal and peak day consumptive water use shown on Attachment CU-4 are the amounts calculated, without such allowance.

9. Consumptive Use Compensation Options (please choose one):

Discontinue consumptive water use NA
Provide water storage See letter transmitting application
Reimburse Commission for water storage See letter transmitting application
Other (explain) NA

10. Preparer:

Name Jan C. Phillips, P.E.

Title Consulting Engineer

Company NA

Address 2611 Walnut Street, Allentown, PA 18104

Phone 610.821.0160 Fax 610. 821.0160

Signature JC Phillips

Date 5-6-09 E-mail Address jcphllps@enter.net

11. Project Sponsor:

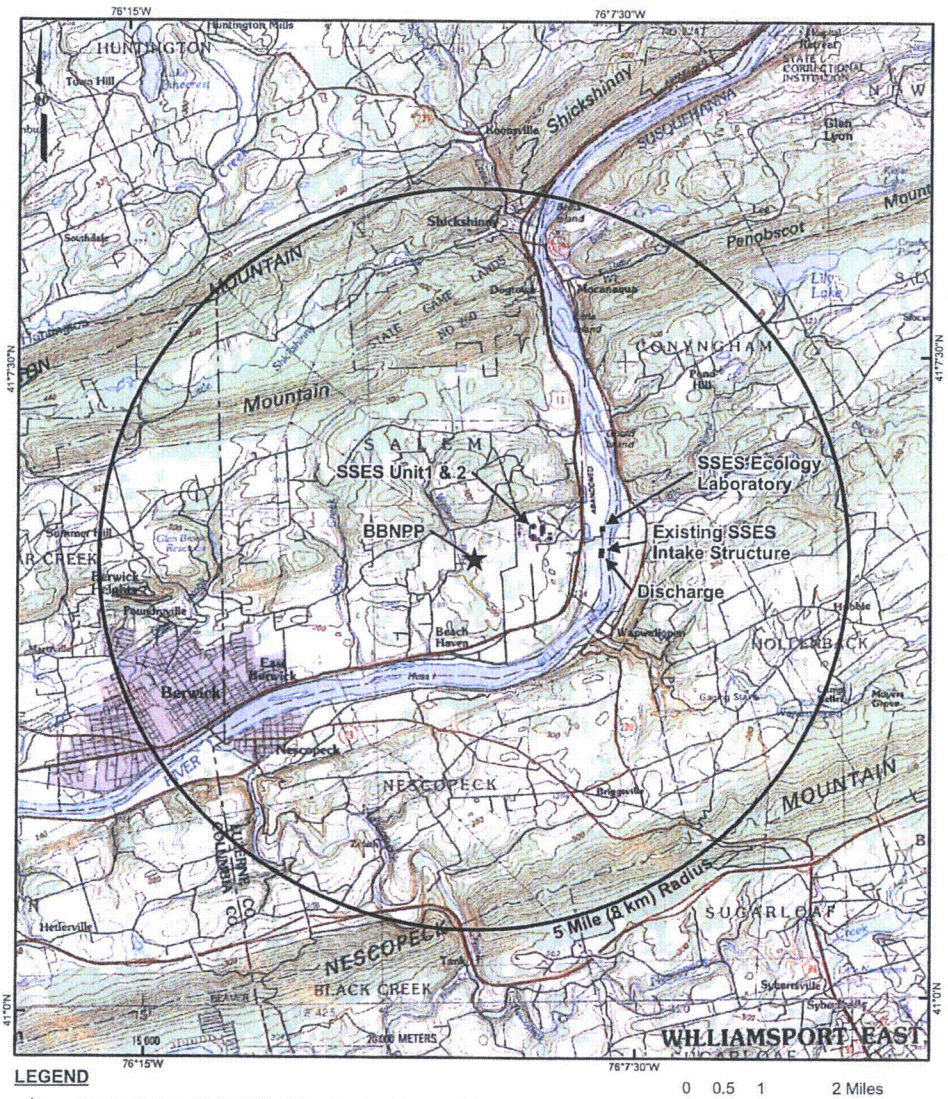
Name (print or type) Terry L. Harpster Title Vice President-Bell Bend Project - Development

Signature [signature] Date 05-13-09

K:\DATA\JPAIN\WORD\FORMS\SRBC\24C (Consumptive Use Instructions and Application).DOC

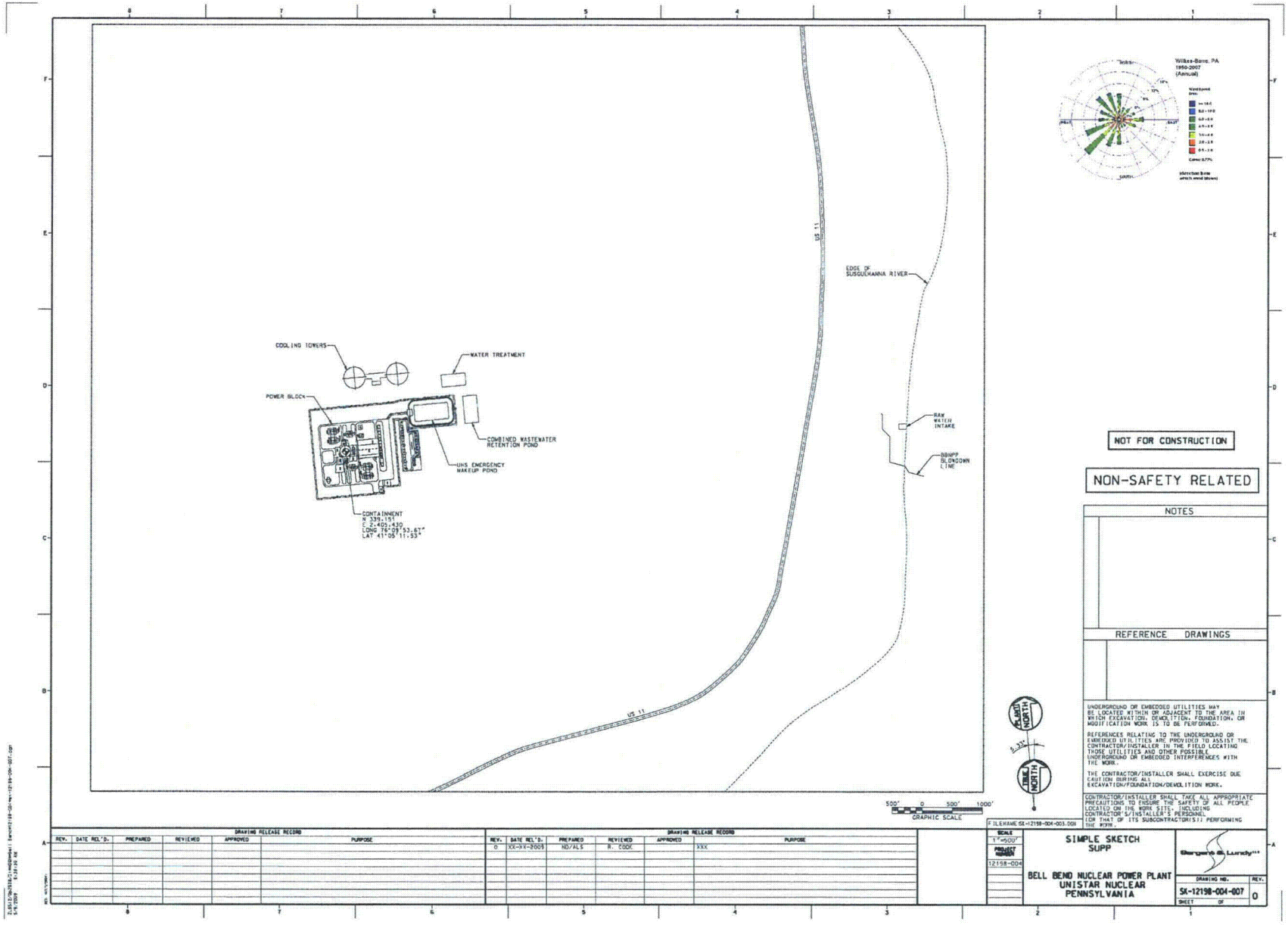
ATTACHMENT CU-1

Figure 2.3-2 {Site Area Topographic Map 5 Mile (8 km) Radius}



REFERENCE:
USGS 1:100K Topographic Maps:
Williamsport East and Sunbury.Maps edited 1984.

ATTACHMENT CU-2



ATTACHMENT CU-3

METHOD OF CALCULATION OF CONSUMPTIVE USE

Maximum Daily (Peak Day) Consumptive Use:

There are seven (7) paths that consume water during normal plant operation. These are:

- Main (Circulating Water System) Cooling Towers Evaporation
- Main Cooling Towers Drift
- Essential Services Water Emergency Makeup System (ESWEMS) Cooling Towers Evaporation
- ESWEMS Cooling Towers Drift
- ESWEMS Retention Pond Evaporation
- Waste Water Retention Basin Evaporation and
- Power Plant Consumptive Use

The maximum daily value for each path is provided below either by reference or calculation, and then the values are summed to provide maximum daily consumptive use.

The derivations of values noted with an asterisk [*] are presented in Attachment SW-3 of the accompanying Surface Water Withdrawal Application.

Main (CWS) Cooling Towers Evaporation *

Maximum daily evaporation based on worst-case weather conditions is 17,720 gpm. [two towers]

Main (CWS) Cooling Towers Drift *

Drift loss is 8 gpm. [two towers]

ESWEMS Cooling Towers Evaporation *

Maximum anticipated evaporation coincident with maximum Main cooling tower evaporation is 1,142 gpm. [two towers]

ESWEMS Cooling Towers Drift *

Drift loss is 4 gpm. [two towers]

ESWEMS Retention Pond Evaporation

The calculated estimate of water evaporation from the ESWEMS Retention Pond for very-conservative meteorological conditions over a 30-day period is 198,300 ft^3. This is converted to gpm by

(198,300 ft^3/30 days) x (7.48 gal/ ft^3) x (1 gpm/1440 gal/day) = 34.3 gpm

Note: The area of the ESWEMS Retention Pond is 247,900 ft^2. The very conservative 30-day evaporation rate is equivalent to
((198,300 ft^3/30 days) / 247,900 ft^2) x 12 in/ft = 9.6 inches.

Waste Water Retention Basin Evaporation

Evaporation for this basin can be determined from the estimate for the ESWEMS Retention Pond (34.3 gpm, above) based on the ratio of surface areas. The surface area for the Waste Water Retention Basin will be 102,000 ft^2

Thus,

(102,000 ft^2/247,900 ft^2) x 34.3 gpm = 14.1 gpm

Power Plant Consumptive Use

The maximum daily value is 40 gpm.

Thus, the maximum daily consumptive use
= 17,720 gpm + 8 gpm + 1,142 gpm + 4 gpm + 34.3 gpm + 14.1 gpm + 40 gpm
= 18,962.4 gpm (27.3 mgd rounded up to 28 mgd for conservatism).

Maximum 30-day Average Consumptive Use:

This value is calculated based on 10 days at the maximum daily CWS cooling tower evaporation from above, 20 days at the CWS cooling tower design point evaporation shown below, and addition of the other consumptive use daily values from above.

The design point evaporation is calculated to be 8,100 gpm and the total for two towers will be 8,100 x 2 = 16,200 gpm. The corresponding blowdown rate assuming 3.0 cycles of concentration is

(Blowdown + drift) = (evaporation)/(cycles-1)

Then,

(Blowdown + 8 gpm) = 16,200 gpm/(3-1)
Blowdown = 8,092 gpm (design point) [two towers]

CWSMWS Total = Evaporation + Blowdown + Drift
= 16,200 gpm + 8,092 gpm + 8 gpm
= 24,300 gpm (35.0 mgd) (design point)

Thus:

Average of 10 days @ CWSMWS Maximum Evaporation + 20 days @ CWSMWS Design Point Evaporation + other daily consumptive use values

= ((17,720 gpm x 60 minutes/hr x 24 hr/day x 10 days)
+ (16,200 gpm x 60 minutes/hr x 24 hr/day x 20 days))/30 days

+ (8 gpm + 1,142 gpm + 4 gpm + 34.3 gpm + 14.1 gpm + 40 gpm) x 60 minutes/hr x 24 hr/day

= 24.1 mgd + 1.8 mgd =
= 25.9 mgd (rounded up to 28 mgd for conservatism and to account for variability within the range of monitoring accuracy required by the Commission).

ATTACHMENT CU-4